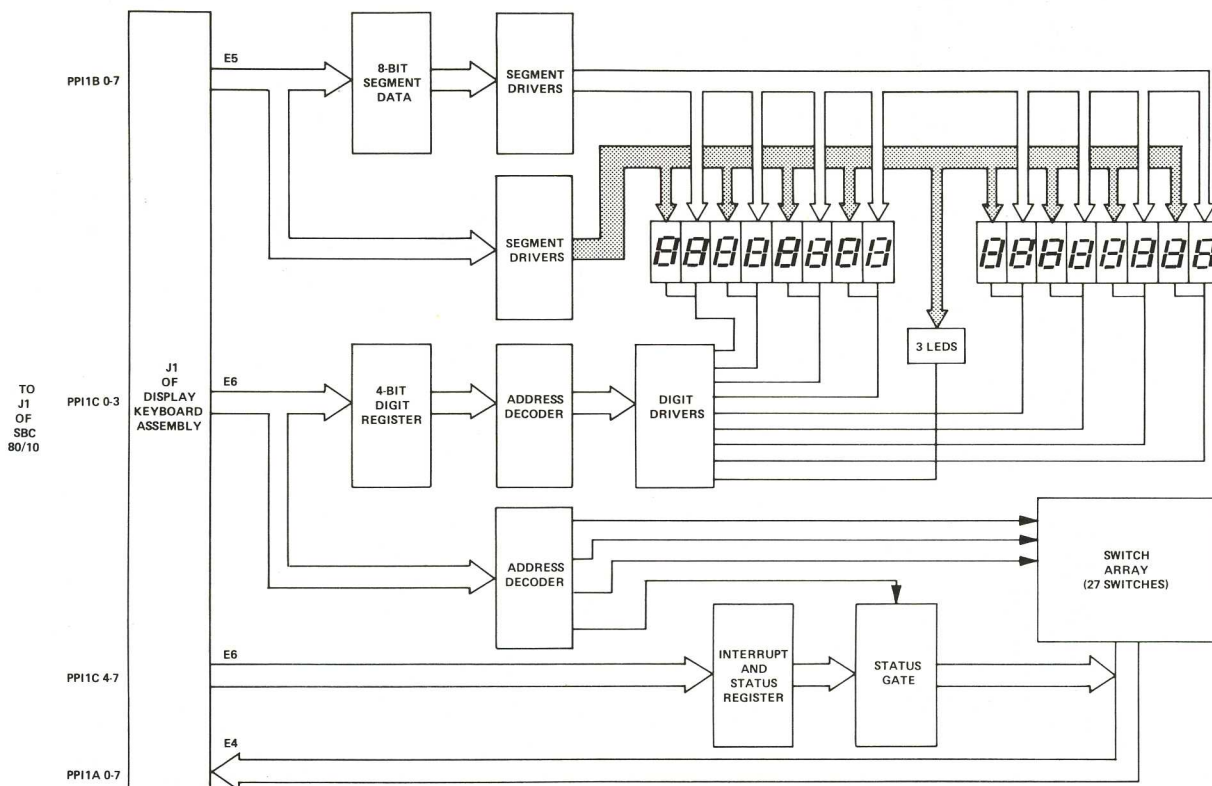


CARD-OF-THE- MONTH

CROMEMCO BYTESAVER™



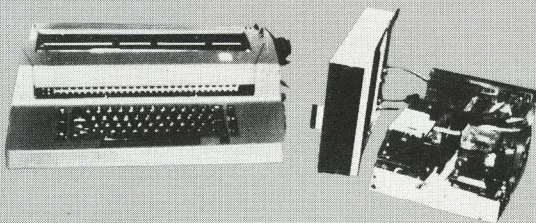
by Roger Edelson



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Manuals from above kits are offered for the purpose of evaluating the kits. Refunds for manuals apply on subsequent kit order.

SK-D1	Selectric Conversion Manual	6.50
SK-D2	Selectric Programming Manual, with listings and timing data.	6.50
DK-D1	Floppy Disk Kit & DOS Manual.	6.50

Are you tired of reentering your favorite program everytime you turn off power? Does the thought of waiting 15 minutes for your BASIC to read in fill you with dread? Would you like to have your assembler/editor/monitor available within one second after turn-on? If you answered yes to any of these questions, then you ought to consider this month's card — the CROMEMCO BYTESAVER™.

If I could purchase one board (after some memory and an I/O card) the BYTESAVER would be my choice. The board is both an economical PROM (Programmable Read Only Memory), with the capacity for a full 8K bytes of storage, and a low-cost means of storing your programs in PROM. The BYTESAVER™ is an S-100 bus compatible memory board. Space is provided for eight 2708 U.V. erasable PROMs, for a full 8K bytes of memory. Using the 2708 allows your 8080 machine to operate no wait states, however, provision for a wait state is provided should you desire to purchase slower 2704 or 2708 PROMS.

The BYTESAVER™ also provides you with your own low cost PROM programmer. Using the software provided programs may be transferred from non-permanent RAM memory to the permanent PROM memory in the BYTESAVER™. Once your program is stored in PROM it's protected from power turn-offs, either accidental or intentional. The PROMs used are U.V. erasable and may be used again and again. Your program may be run either directly out of PROM, or using the software provided, it may be transferred to RAM memory beginning at any 1K segment selected. The software provided with the BYTESAVER™ controls both the transfer of data from the PROMs or to the PROMs. It is designed so there is no need for a keyboard. Just set the computer sense switches as instructed in the documentation. Transfer of RAM content to PROM takes less than a minute, and transfer of the 8K from PROM to RAM is complete in less than one second. The software controls the computer lights to provide verification of complete and accurate transfer of memory content.

As far as the design goes, the BYTESAVER™ is not particularly complex. The board is S-100 bus (ALTAIR/IMSAI) compatible, and contains space for eight 2708/2704 PROMs. In order to program the eight 2708 PROMs a high voltage (+30V) supply is required, and this is generated from the regulated +5V supply by a DC to DC Converter. Switching (Protect/Unprotect) is provided to disable this supply to avoid inadvertent overwrite of the memory in the case of a user program malfunction. The DC to DC converter appears to be a standard blocking oscillator configuration with a very simple feedback regulator. I say appears because the schematic does not show the internal arrangement of the pulse transformer used in the converter. Since there is hardly anything magic about a blocking oscillator it seems strange that Cromemco doesn't help those of us who might be able to service our own boards by including the transformer arrangement.

Distribution of the program voltage to the 2708s is by means of discrete transistors controlled by 7406 open-collector inverting buffers. A schematic of the BYTESAVER™ is shown in Figure 3. Control of the CS/WE pin (which requires +12 V during WRITE) is done by a 7406 and a discrete transistor which allows

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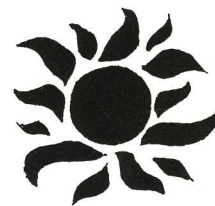
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this pin to float up to +12V. During READ operation the \overline{CS}/WE pin is either a ground or +5V, as the +12V supply is disabled.

While we are discussing the schematic let me suggest to Cromemco that the 7406 is an inverting buffer and I would prefer it to be shown that way, always. It is difficult to follow a logic diagram if the inverting sign is left out, even if it is desired to show logical flow. If necessary an inverting circle could have been placed at the \overline{CS}/WE input pin at the 2708. A further help would have been to have the component designation on the schematic also. These are all minor quibbles, however, and they do not detract from the board's usefulness and operation.

Returning to the BYTESAVER™ circuit, the data bus lines are all buffered by 74367's (the standard 54/74 equivalent to the ubiquitous 8T97 series). Address decoding for the highest 8K of memory (A13-A15) is provided by jumper connections on the board. In order to provide addressing in this fashion using a three input NAND gate (rather than the slightly more expensive and easier to use octal decoder and dip switch) inverted address signals must be made available. Three inverters of a 74LS04 are used to derive A13, A14, and A15. Since there were three inverters left over, these were used to buffer the A10 through A12 signals to the 7442. For this reason the low order address selects the output 7 pin. A bit strange but it works, and very well.

A 74123 dual retriggerable one-shot is used to provide the proper pulse width (N/MS) needed for programming the PROM. This pulse is also used to produce a wait state during PROM programming. As mentioned earlier, it is possible to jumper connect the capability for one wait state if slower PROMs are used. This is done at the input to the three input NAND gate whose output drives the clear pin on the second half of the 7474 'D' type Flip-Flop.

The board is high quality G-10 material with tinned solder pads and gold plated edge board connectors for reliability. The kit is fully socketed and assembly is suggested to be about one evening; it doesn't even take that long. A high quality soldermask contributes to the ease of assembly and minimizes the chance of solder splashes. The assembly instructions are explicit enough and the board is adequately screened to provide easy identification of component placement. Cromemco recommends no diode be installed in the position below Q0. This will prevent inadvertent rewrite of the BYTEMOVER™ stored in PROM O. The assembly instructions also warn that a pair of IC regulators look physically similar, BUT are NOT interchangeable. Also a nylon screw is provided to prevent shorting a regulator to ground.

One of the niceties of the BYTESAVER™ is the capabilities provided by its software. When you purchase a BYTESAVER™ with one 2704 PROM, the Bytemover software is pre-programmed in that PROM. For your information and assistance, Cromemco has allowed INTERFACE AGE to publish the BYTEMOVER™ software. This program is included at the end of this article.

The PROM containing the Bytemover software is normally inserted into PROM location Zero on the Bytesaver board.

The Bytemover software can be used to program a

PROM in any of the PROM locations on the Bytesaver board. The Bytemover software can also be used to transfer programs from PROM to RAM.

The operation of the Bytemover software is controlled by setting front panel sense switches on any S-100 bus compatible computer. However, to use the Bytemover software there must be at least one RAM board in the computer beginning at location Zero in the memory map. Furthermore, this RAM board must be unprotected for proper execution of the Bytemover software.

Software can be loaded into a 2704 or a 2708 in as small increments as you desire provided it is added to previously unused areas in that PROM.

This is done by first using Bytemover to move the current contents of the PROM down to RAM which corresponds to the unused portion of the PROM and finally using Bytemover again to reprogram the PROM with the new software.

Although the entire PROM must always be programmed, it never hurts to re-write the same information over again. And, of course, an erased PROM in which all bits are "1" may be programmed at any time.

In general, it is OK to write a "1" over a "1", a "0" over a "0", or a "0" over a "1", but to write a "1" over a "0" the PROM must be completely erased.

If the PROM to which you want to add software is PROM zero on the Bytesaver board, turn off AC power to the computer and install a 1N914 diode just below Q0. Turn the power back on and move Bytemover to RAM zero. Add the new software to an area of RAM which corresponds to an unused portion of PROM zero.

Re-program PROM zero by following the example in the manual supplied. Note you need not erase the PROM to do this. Turn the computer power off and remove the 1N914 diode below Q0.

The Bytesaver software supplied with the board is designed to program the PROM in approximately 30 seconds. This is generally a sufficiently long period of programming time. However, to be completely within the manufacturer's specifications, the PROM should be programmed for two to three minutes.

If you wish to program your PROMs for longer than 30 seconds, the Bytemover software may be easily modified. Simply change the contents of memory location 77H (Hex) from 40H to 00H. Now you must manually time the programming operation and depress the stop switch at the end of the operation.

Before using the Bytesaver, you must install three jumper wires to set the location of the Bytesaver in memory. This adjustment is shown in Figure 1. The assembled Bytesaver comes with A13, A14, and A15 each tied to the corresponding 'HI' pad to position the board at the very top of memory. In the following instructions it is assumed this is the jumper connection used.

1. Turn off all power to the computer and plug in the Bytesaver board.
2. Be sure the program power on the Bytesaver is turned off (program power switch in the down position).
3. Turn on the computer. Raise the reset switch, the stop switch and then raise the reset switch once again to initialize the computer.

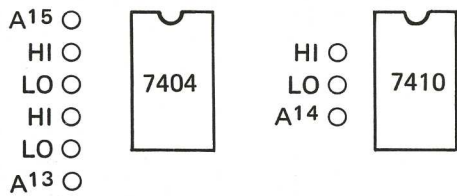


FIGURE 1. This diagram illustrates the positioning of the Bytesaver address in memory. The preassembled Bytesaver comes with A¹⁵, A¹⁴ and A¹³ connected to the corresponding HI terminals so memory address occurs when these lines are HI. Any or all of these address lines may be connected to the corresponding LO terminal to move the memory board lower in memory. Consequently, there are eight positions in which this board may be used.

4. Raise the address switches A¹⁵, A¹⁴, and A¹³. All other address switches should be in the down position.
5. Raise the examine switch. You are now examining the contents of the first byte of PROM in PROM location zero of the Bytesaver memory board (memory location 340 000). If the PROM supplied with your Bytesaver is in this PROM location, the data lights will read '061', the first byte of the Bytemover program.

The following examples show the steps needed to transfer and program the PROMs and the ease in which it is done.

EXAMPLE 1: Transfer the Bytemover Program from PROM to RAM beginning at RAM location Zero.

1. Raise the reset switch.
2. Depress the unprotect switch (on the Altair front panel).
3. Raise A¹⁵, A¹⁴, and A¹³. Raise the examine switch. The data lights should read '061' octal.
4. Now set the sense switches for the task to be done, referring to Figure 2.
5. Push the run switch. In less than one second, the contents of PROM will be transferred to RAM. The contents of PROM are unaffected by this operation.
6. Raise the stop switch.
7. Raise the reset switch. Note that the data lights read '061.'

EXAMPLE 2: Program a 2708 PROM inserted in PROM location one. This PROM is to be programmed with the contents of the first 1K bytes of RAM beginning at location zero in memory. The Bytesaver software is still in the PROM installed in PROM location zero on the Bytesaver board.

A ¹⁵	Down	to transfer from Prom to Ram.
A ¹⁴	Down	for the transfer of 1K bytes.
A ¹³	Down	All down since we are transferring from the PROM that contains Bytemover (PROM 0).
A ¹²	Down	
A ¹¹	Down	
A ¹⁰	Down	All down for storage to begin at location zero in RAM.
A ⁹	Down	
A ⁸	Down	

1. Raise the reset switch.
2. Depress the unprotect switch on the Altair front panel).
3. Raise A¹⁵, A¹⁴, and A¹³. Raise the examine switch. The data lights should read '061' octal.
4. Raise the protect switch on the Bytesaver board (i.e. program power switch to the on position). The protect light on the front panel should turn off when this switch is raised.
5. Now set the sense switches for the task to be done.

A ¹⁵	Up	to program a PROM
A ¹⁴	Down	(always down for PROM programming).
A ¹³	Down	To select the PROM 1K higher in memory than the PROM that contains Bytemover
A ¹²	Down	
A ¹¹	Up	
A ¹⁰	Down	All down for transfer to begin at location zero in RAM.
A ⁹	Down	
A ⁸	Down	

6. Push the run switch. Note that panel light A⁹ is blinking at a rate of about twice per second. When this light stops blinking, the PROM programming is complete.

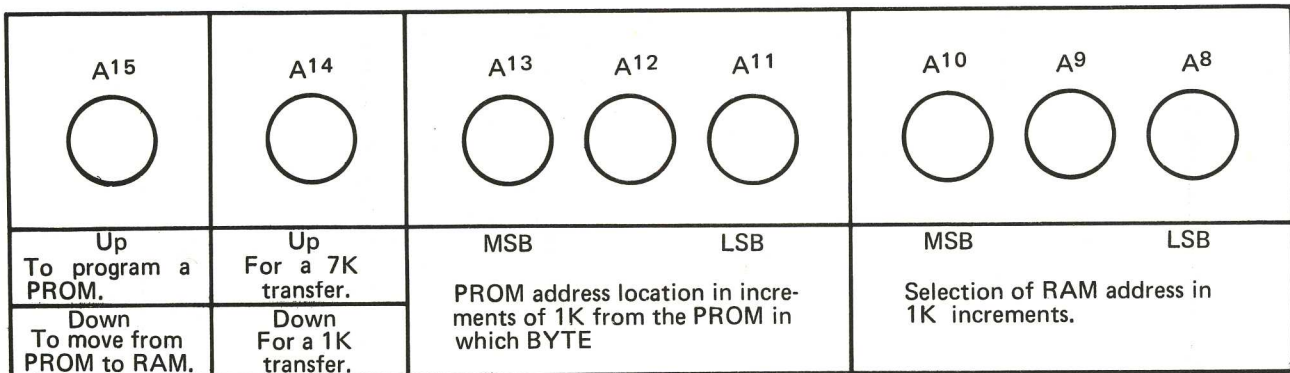
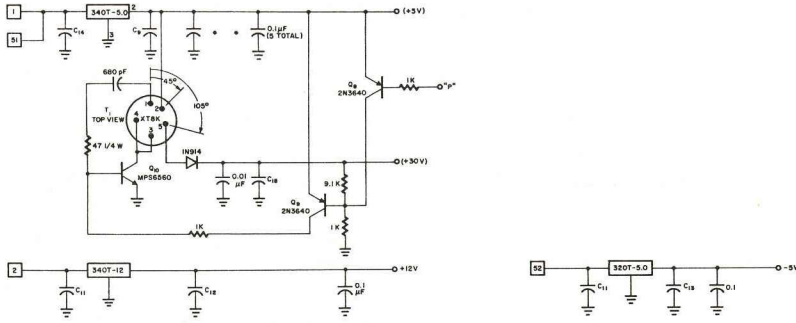
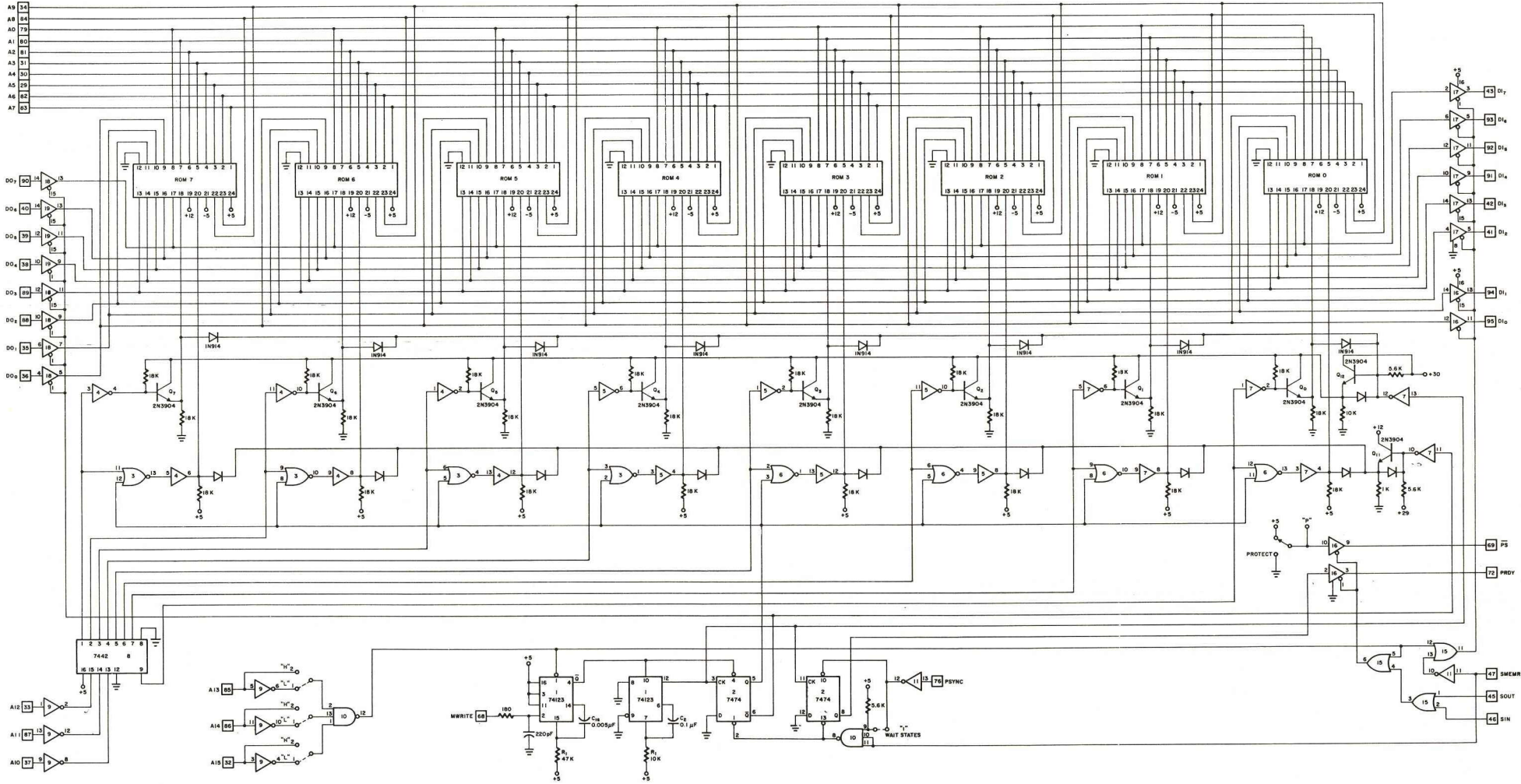


FIGURE 2. FUNCTION OF THE SENSE SWITCHES IN BYTEMOVER.



BYTESAVER™ SCHEMATIC



INTERFACE AGE 69

- Raise the stop switch.
- Now note the INTE light on the front panel. If this light is on, the Bytemover Verifier has verified that the contents of the programmed PROM are indeed identical to the contents of the selected 1K bytes of RAM. If this light is off, the PROM is not programmed correctly. This could be due to a defective PROM.

EXAMPLE 3: Altair 8K BASIC can be stored in seven 2708 PROMs. Given that these seven PROMs are in PROM locations one through seven of the Bytesaver board, 8K BASIC can easily be transferred into RAM using the following procedure.

- Raise the reset switch.
- Depress the unprotect switch (on the Altair front panel).
- Raise A₁₅, A₁₄, and A₁₃. Raise the examine switch. The data lights should read '061' octal.
- Now set the sense switches for the task to be done.

A15	Down	to transfer from PROM to RAM.
A14	Up	for a 7K transfer.
A13	Down	To begin transfer from the PROM 1K higher in memory than the Bytemover program.
A12	Down	
A11	Up	All down for storage to begin at location zero in RAM.
A10	Down	
A9	Down	
A8	Down	

- Push the run switch. In less than one second BASIC will be loaded into RAM (it sure beats paper tape!). Now raise the stop switch.

EXAMPLE 4: If you do not have Bytemover in PROM, you can program a PROM with Bytemover that is stored in RAM. The Bytemover software must be loaded into RAM beginning at location zero. The Bytemover software can then be burned into a PROM using the following procedure.

- Raise the reset switch.
- Depress the unprotect switch (on the Altair front panel).
- Insert an erased PROM into PROM location zero.
- Examine location 000 240 in memory.
- Raise the program power switch on the Bytesaver board.
- Set the sense switches with A₁₅, A₁₄, and A₁₃ up.
- Push the run switch. When the A₉ light stops blinking, the programming is complete. The INTE light will be on.
- Turn off PROM program power by depressing the switch on the Bytesaver board.

That's about all there is to it to use a Bytesaver. It's both convenient and easy. The new instruction manual is a great improvement over the previous one. I would have liked to have a little more information on erasing PROMs. The PROM should be about one inch away

and exposed for about twenty minutes. This assumes an integrated dosage of 10W-SECS/CM² is required. If shorter times or lower output devices are used, I would recommend placing the PROMs in the Bytesaver and running a memory check. All bits should be '1' for correct operation. PROM erasers are available from various computer stores around the country.

The Bytesaver is a tremendous adjunct to your computer capability (I have two, one with an assembler/monitor program and the other with BASIC residing in memory). If you expect to program a greater number of different PROMs you would be wise to replace the PROM sockets with low or zero insertion force types. Either that or place the PROM in carriers. This is to reduce the strain on their leads. The Bytesaver may be purchased with the Bytemover software already stored in either a 2704 or a 2708. By the way, the 2704 is just a 2708 with a bad bit in the upper 512 bytes. 2708 PROMs can also be purchased from Cromemco, but their price is a little higher than you can get elsewhere, but the convenience may be worthwhile. Anyway if you choose to buy it, I would heartily recommend considering the Cromemco Bytesaver as your next purchase.

```

0000          0000 * BYTEMOVER (T.M.) SOFTWARE FOR
0000          0001 * CROMEMCO 8K BYTESAVER (T.M.)
0000          0002 * VERSION 3. 1
0000          0003 * SELF-RELOCATING SOFTWARE LOCATABLE AT ANY
0000          0004 * 1024 BYTE (1K) BOUNDARY IN MEMORY
0000          0009 * ROUTINE TO FIND ONESELF IN MEMORY
0000          0010 SP EQU 6
0000          0019 * DEFINE FIRST 4 BYTES IN MEMORY AS STACK
0000 31 00 00  0020 LXI SP, 0
0003          0029 * SAVE FIRST FOUR BYTES IN REGISTERS
0003 C1       0030 POP B
0004 D1       0040 POP D
0005          0049 * REPLACE BYTE 0 WITH A 'RETURN'
0005 2E C9   0050 MVI L, 0C9H
0007 F3      0051 DI
0008 E5      0060 PUSH H
0009 E5      0070 PUSH H
000A 00      0080 NOP
000B 00      0081 NOP
000C 00      0082 NOP
000D 31 04 00 0090 LXI SP, 4
0010 CD 00 00 0100 CALL 0
0013          0101 * ROM LOCATION NOW IN BYTE 3
0013 31 02 00 0110 LXI SP, 2
0016 E1      0120 POP H
0017          0129 * RETURN BYTES 0-3
0017 31 04 00 0130 LXI SP, 4
001A D5      0140 PUSH D
001B C5      0150 PUSH B
001C          0159 * STORE ROM LOCATION IN SP
001C F9      0160 SPHL
001D 0E 00   0170 MVI C, 0
001F 59      0180 MOV E, C
0020 69      0190 MOV L, C
0021          0199 * INPUT SENSE SW COMMANDS
0021 DB FF   0200 IN 255
0023 57      0210 MOV D, A
0024          0219 * STRIP RAM ADDRESS
0024 E6 07   0220 ANI 7
0026 07      0230 RLC
0027 07      0240 RLC
0028          0249 * STORE RAM ADDRESS IN BC
0028 47      0250 MOV B, A
0029 7A      0260 MOV A, D
002A          0269 * STRIP ROM ADDRESS
002A E6 38   0270 ANI 56
002C 0F      0280 RRC
002D 00      0290 NOP
002E 67      0300 MOV H, A
002F 39      0310 DAD SP
0030 2E 00   0320 MVI L, 0
0032 7A      0330 MOV A, D
0033 EB      0340 XCHG
0034          0341 * ADDRESS OF ROM BEING PROCESSED IN DE
0034          0349 * BRANCH TO TRANSFER OR PROGRAM ROUTINE

```

0034 E6 80	0350 ANI 128	0063 60	1040 MOV H, B
0036 0F	0360 RRC	0064	1049 * MOVE RAM ADDRESS INTO SP
0037 0F	0370 RRC	0064 F9	1050 SPHL
0038 C6 2D	0380 ADI 45	0065 67	1060 MOV H, A
003A 21 00 00	0390 LXI H, 0	0066 2E 6B	1070 MVI L, 107
003D 6F	0400 MOV L, A	0068	1079 * INCREMENT RAM ADDRESS
003E 39	0410 DAD SP	0068 01 00 00	1080 LXI B, 0
003F E9	0420 PCHL	006B	1089 * INCREMENT RAM ADDRESS
0040	0500 * ROUTINE TO TRANSFER ROM TO RAM	006B 3B	1090 DCX SP
0040 F9	0510 SPHL	006C	1098 * USE STAX AND POP 6 (PSW)
0041 21 0B 00	0520 LXI H, 11	006C	1099 * TO MOVE DATA FROM ROM TO RAM
0044 39	0530 DAD SP	006C F1	1100 POP 6
0045 EB	0550 XCHG	006D 12	1110 STAX D
0046 F9	0560 SPHL STACK CONTAINS ROM LOCATION	006E	1119 * INCREMENT ROM ADDRESS
0047 EB	0570 XCHG H&L CONTAIN LOOP ADDRESS	006E 13	1120 INX D
0048 11 00 00	0580 LXI D, 0	006F	1129 * INCREMENT BYTE COUNT
004B	0588 * START OF TRANSFER LOOP	006F 03	1130 INX B
004B	0589 * INCREMENT ROM ADDRESS	0070	1138 * B STORES TWO CONSTANTS
004B 3B	0590 DCX SP	0070	1139 * # COMPLETE PASSES & IN ROM CNT
004C	0599 * MOVE DATA FROM ROM TO RAM	0070 78	1140 MOV A, B
004C F1	0600 POP 6	0071	1149 * # PASSES = 32 ?
004D 02	0610 STAX B	0071 FE FC	1150 CPI 252
004E	0619 * INCREMENT RAM ADDRESS	0073 3F	1160 CMC
004E 03	0620 INX B	0074 1F	1170 RAR
004F	0629 * INCREMENT BYTE COUNT	0075 1F	1180 RAR
004F 13	0630 INX D	0076	1198 * SET 64 TO 0 FOR TWO MINUTE TIMER VERSION
0050 7A	0640 MOV A, D	0076 E6 40	1200 ANI 64
0051 E6 04	0650 ANI 4	0078	1201 * A=64 IF COMPLETED 32 PASSES
0053 07	0660 RLC	0078 2E 7D	1205 MVI L, 7DH
0054 07	0670 RLC	007A 85	1210 ADD L
0055 00	0680 NOP	007B 6F	1220 MOV L, A
0056 85	0690 ADD L	007C E9	1225 PCHL
0057 6F	0070 MOV L, A	007D 2E 6B	1226 MVI L, 6BH
0058 E9	0710 PCHL	007F 78	1230 MOV A, B
0059 00	0716 NOP	0080 E6 04	1240 ANI 4
005A 00	0717 NOP	0082	1241 * A=4 IF END OF 1024 BYTE PASS
005B	0719 * JUMP TO 00B1 FROM TRANSFER ROUTINE	0082 07	1250 RLC
005B 3E 56	0720 MVI A, 56H	0083 07	1260 RLC
005D 85	0725 ADD L	0084 07	1270 RLC
005E 6F	0730 MOV L, A	0085 85	1280 ADD L
005F E9	0740 PCHL	0086 6F	1290 MOV L, A
0060	1000 * ROUTINE TO PROGRAM ROM	0087	1291 * GO BACK TO 1090 UNLESS OVERFLOW
0060 00	1010 NOP	0087	1292 * THEN GO TO 1380 FOR
0061	1019 * MOVE RAM ADDRESS INTO HL	0087	1293 * ADDRESS SUBTRACTION
0061 69	1020 MOV L, C	0087	1294 * OR 2135 FOR QUILTS
0062 7C	1030 MOV A, H	0087 E9	1300 PCHL

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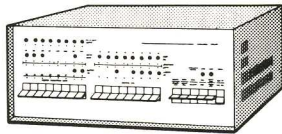
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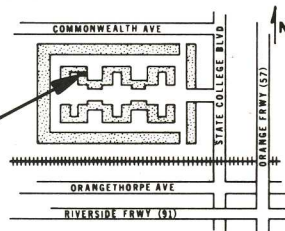


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0088 00	1350 NOP
0089 00	1360 NOP
008A 00	1370 NOP
008B	1378 * ANOTHER PROGRAM PASS TO BE DONE
008B	1379 * ADJUST ROM AND RAM ADDRESSES
008B 7C	1380 MOV A, H
008C 21 00 FC	1390 LXI H, 64512
008F	1399 * SUBTRACT 1024 FROM ROM ADDRESS
008F 39	1400 DAD SP
0090 F9	1410 SPHL
0091 21 00 FC	1420 LXI H, 64512
0094	1429 * SUBTRACT 1024 FROM RAM ADDRESS
0094 19	1430 DAD D
0095 EB	1440 XCHG
0096 67	1450 MOV H, A
0097 2E 6B	1460 MVI L, 107
0099 78	1470 MOV A, B
009A E6 F8	1480 ANI 248
009C	1489 * INCREMENT PASS COUNTER BY ONE
009C C6 08	1490 ADI 8
009E 47	1495 MOV B, A
009F	1499 * GO BACK TO 1090
009F E9	1500 PCHL
00A0	2000 * ROUTINE TO LOAD BYTE MOVE INTO ROM
00A0 DB FF	2010 IN 255
00A2 47	2020 MOV B, A
00A3 E6 E0	2030 ANI 224
00A5 1E 00	2040 MVI E, 0
00A7 4B	2050 MOV C, E
00A8 57	2060 MOV D, A
00A9 78	2070 MOV A, B
00AA E6 1F	2080 ANI 31
00AC 47	2090 MOV B, A
00AD 67	2100 MOV H, A
00AE 2E 60	2110 MVI L, 96
00B0 E9	2120 PCHL
00B1	2121 * CHECK FOR 7K TRANSFER OF ROM TO RAM
00B1 C6 1A	2122 ADI 1AH
00B3 6F	2123 MOV L, A
00B4 DB FF	2124 IN 255
00B6 E6 40	2125 ANI 64
00B8 0F	2126 RRC
00B9 0F	2127 RRC
00BA 85	2128 ADD L
00BB 6F	2129 MOV L, A
00BC E9	2130 PCHL
00BD	2133 * PROGRAMMER VERIFICATION ROUTINE
00BD	2134 * PART 1
00BD 7C	2135 MOV A, H
00BE 21 00 FC	2145 LXI H, 64512
00C1 39	2155 DAD SP
00C2 F9	2165 SPHL
00C3 2E CD	2175 MVI L, 0CDH
00C5 67	2185 MOV H, A
00C6 E9	2195 PCHL
00C7 00	2205 NOP
00C8 00	2210 NOP
00C9 00	2215 NOP
00CA 00	2220 NOP
00CB	2229 * ROM TO RAM TRANSFER STOP ROUTINE
00CB FB	2230 EI
00CC E9	2240 PCHL
00CD	2248 * PROGRAMMER VERIFICATION ROUTINE
00CD	2249 * PART 2
00CD 7C	2250 MOV A, H
00CE 21 00 FC	2260 LXI H, 64512
00D1 19	2270 DAD D
00D2 EB	2280 XCHG
00D3 2E F1	2290 MVI L, 0F1H
00D5 67	2300 MOV H, A
00D6 01 00 00	2310 LXI B, 0
00D9 E9	2320 PCHL
00DA 00	2625 NOP
00DB	2629 * 7K TRANSFER COMPLETION CHECK
00DB D6 90	2630 SUI 90H
00DD 6F	2640 MOV L, A
00DE 7A	2650 MOV A, D
00DF C6 04	2660 ADI 4
00E1 57	2670 MOV D, A
00E2 FE 38	2680 CPI 56
00E4 3F	2685 CMC
00E5 3E 00	2690 MVI A, 0
00E7 1F	2700 RAR
00E8 85	2710 ADD L
00E9 6F	2720 MOV L, A
00EA E9	2730 PCHL
00EB	2879 * ROM PROGRAMMER STOP ROUTINE
00EB 00	2880 NOP
00EC 00	2881 NOP
00ED FB	2885 EI
00EE E9	2890 PCHL
00EF E9	2900 PCHL

00F0 E9	2906 PCHL
00F1	2918 * PROGRAMMER VERIFICATION ROUTINE
00F1	2919 * PART 3
00F1 3B	2920 DCX SP
00F2 F1	2930 POP 6
00F3 EB	2940 XCHG
00F4	2949 * COMPARE FOR GREATER
00F4 BE	2950 CMP M
00F5 EB	2960 XCHG
00F6 17	2970 RAL
00F7 E6 01	3000 ANI 1
00F9 2F	3010 CMA
00FA 3C	3011 INR A
00FB 85	3015 ADD L
00FC 6F	3020 MOV L, A
00FD 3B	3030 DCX SP
00FE 3B	3040 DCX SP
00FF	3050 * COMPARE FOR LESSER
00FF F1	3055 POP 6
0100 2F	3056 CMA

0101 EB	3058 XCHG
0102 86	3059 ADD M
0103 EB	3060 XCHG
0104 C6 07	3061 ADI A, 1
0106 3F	3065 CMC
0107 17	3070 RAL
0108 E6 01	3090 ANI 1
010A 2F	3100 CMA
010B 3C	3101 INR A
010C 85	3105 ADD L
010D 6F	3110 MOV L, A
010E 03	3130 INX B
010F 13	3140 INX D
0110 78	3150 MOV A, B
0111 E6 04	3180 ANI 4
0113 2F	3190 CMA
0114 3C	3191 INR A
0115 85	3195 ADD L
0116 6F	3200 MOV L, A
0117 E9	3210 PCHL

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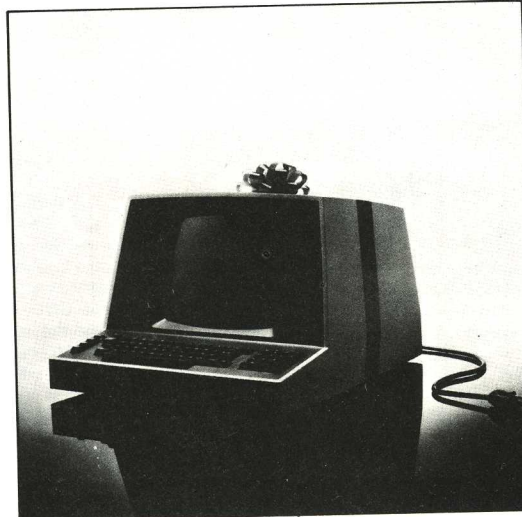
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